2. Reference Information

2-1 Introduction to DVD

2-1-1 The Definition of DVD

DVD is the next generation medium and is the acronym of the Digital Versatile Disc or thr Digital Video Disc, which maximizes the saving density of the disk surface using the MPEG-2 compression technology to enable the storage of 17G bytes of data on the same size CD.

1) 7 times the storage capacity of the conventional CD

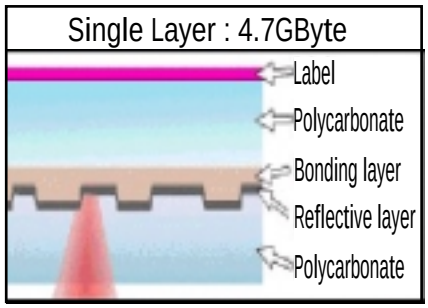
- ◆ Minimized the track pitch and pit size to 1/2 of conventional CD.
- ◆ Uses red laser with short-wavelenght of 650nm (635nm).

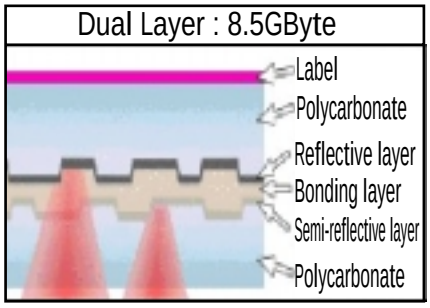
⌘ DVD Vs. CD-ROM

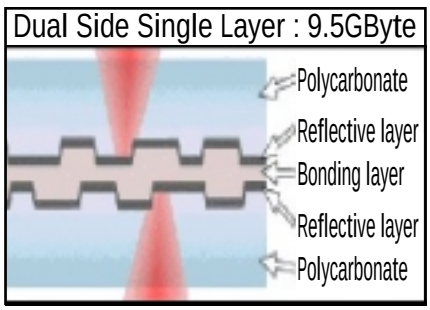
	DVD		CD-ROM
	Single-Layer	Dual-Layer	
Laser Wavelength	650nm (635nm)		780nm
Track Pitch	0.75um		1.6um
Disc Diameter	120mm		
Disc Thickness	1.2 (0.6 x 2) mm		1.2mm
Linear Velocity	3.49m/s	3.84m/s	1.2 ~ 1.4m/s

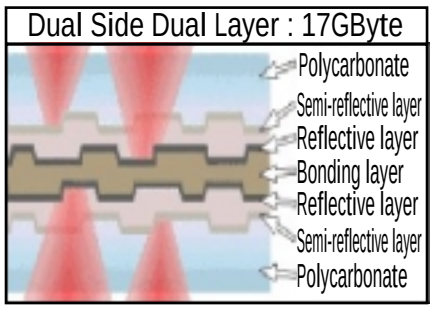
2) Disc Formats

DVD consists of two 0.6mm discs attached together, enabling access to the upper and lower side of the disk, and 4 sides could be used at maximum.









2-1-2 DVD Types

FORMAT	TYPE	APPLICATIONS
DVD-Video	Playback Only	High quality image and sound for movies and other video media.
DVD-ROM	Read Only	Multi-functional, multi-midia software that requires large storage capacity.
DVD-Audio	Playback Only	High quality sound that exceeds the CD, multi-channel Audio.
DVD-R	1 Time Recording	Storage media for the computer.
DVD-RAM	Rewritable	Data access/storage media for the computer.

2-2 DVD-Video Fromat

2-2-1 Main Features

1) Able to store up to 160 minutes of Movie by utilizing the MPEG-2 compression technology. (Aver. 133min.)

2) Enables more than 500 lines of horizontal resolution. (Class corresponding to the Master Tapes used in broadcasting stations)

3) Provides Dolby Digital 5.1ch Surround 3D sound, which enables theater quality sound (NTSC area).
- ◆ For PAL areas, 1 of either MPEG-2 Audio or Dolby Digital must be selected.

4) Multi-Language
- ◆ Able to store up to 8 languages of dubbing.
- ◆ Able to store up to 32 subtitle languages.

5) Milti-Aspect Ratio
3TV Mode alternatives ; 16:9 Wide Screen (DVD Basic) / 4:3 Pan & Scan / Letter Box.

6) Multi-Story
Possible to implement Interactive Viewing which enables the user to select the scenario.

7) Multi-Angle
Able to view the camera angle you selected among the scenes recorded with multiple camera angles.

Note ; The above media features must have the DVD Title that contains the appropriate contents to function properly.

2-2-2 Audio & Video Specifications

<table>
<tr><th colspan="2">Classification</th><th colspan="2">DVD-Video</th><th>Video-CD</th><th>LD</th></tr>
<tr><td rowspan="6">VIDEO</td><td>Compression</td><td colspan="2">MPEG-2</td><td>MPEG-1</td><td rowspan="2">Analog</td></tr>
<tr><td>Pixel</td><td colspan="2">720 x 480</td><td>352 x 240</td></tr>
<tr><td>Horizontal resolution</td><td colspan="2">Max. 500 Lines</td><td>Max. 250 Lines</td><td>Max.420 Lines</td></tr>
<tr><td>Compression rate</td><td colspan="2">1/40</td><td>1/140</td><td rowspan="2">Analog</td></tr>
<tr><td>Transmission speed</td><td colspan="2">Max. 9.8Mbps (variable)</td><td>1.15Mbps (fixed)</td></tr>
<tr><td>TV aspect</td><td colspan="2">16:9 / 4:3</td><td>4:3</td><td>4:3</td></tr>
<tr><td rowspan="5">AUDIO</td><td>Audio</td><td colspan="2">Max. 8 streams</td><td>2CH stereo</td><td rowspan="5">2 Analog CH.
2 Digital CH.
(16Bit/44.1KHz)
or
1 Analog CH.
1 Stream of Dolby Digital
2 Digital CH.
(16Bit/44.1KHz)</td></tr>
<tr><td>Recording type</td><td>Dolby Digital</td><td>Linear PCM</td><td>MPEG-1 Layer 2</td></tr>
<tr><td>Transmission rate</td><td>448Kbps/stream</td><td>6.144Mbps/stream</td><td>224Kbps</td></tr>
<tr><td>Channel</td><td>5.1CH/stream</td><td>8CH/stream</td><td>2CH</td></tr>
<tr><td>Sampling frequency</td><td>48KHz</td><td>16, 20, 24Bit/48, 96KHz</td><td>16Bit/44.1KHz</td></tr>
</table>

2-2-3 Detailed Feature

DVD-Video Feature 1 — **When Developing the DVD Software, various addition and modification is possible.**

As the storage capacity increases, the DVD-Video separates the main data and the additional data such as the Multi-Function into different data areas, enabling the control of time-data ratio to provide the format that enables the flexible Software development

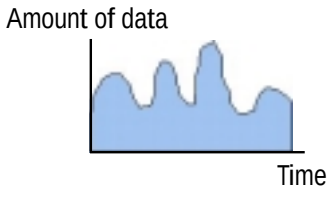
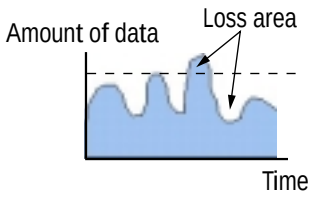
◆ 1 Movie (3.5Mbps)
+ Subtitle (1 Language)
+ Surround Audio (1 Language)
= 160min storage (4.673Gbytes)

◆ 1 Movie (3.5Mbps)
+ Subtitle (4 Language)
+ Surround Audio (4 Language)
= 160min storage (4.680Gbytes)

◆ 1 Music Video (4Mbps)
+ 2ch High quality Audio (96kHz / 24bit)
= 72min storage (4.648Gbytes)

DVD-Video Feature 2 — **Application of the MPEG-2 compression technology.**

DVD-Video uses the variable compresion technology, the MPEG-2 to compress the moving image optimally, minimizing the Data loss to Provide a clear, natural screen while increasing the storage time.

DVD-Video	◆ MPEG-2 (Variable compression : Max. 1 / 40) ✓ Field unit compression. ✓ Compression rate change according to the amount of Data. ✓ Differentiates the still image anf the moving image compression rete, reducing Data loss and enables efficient compression.	
Video-CD	◆ MPEG-1 (Fixed compression : Max. 1 / 140) ✓ Frame unit compression. ✓ Compresses all data using the same ratio. - Fast movements are jagged, and unnatural	

DVD-Video Feature 3 | **High quality surround audio.**

DVD-Video can store the audio using the 5.1ch Dolby Digital compression or the advanced Liner PCM method, providing the better-than-CD quality and theater like audio quality.

◆ Dolby Digital (AC-3)
- ✓ Unlike the traditional Dolby pro-Logic method, the Dolby Digital method separates all 5 main channels (Front L/R, Center, Surround (Rear) L/R)and the Sub woofer to provide live surround audio.
- ✓ Using the Down Mix method, the conventional Dolby Pro-Logic and Stereo are all compatible.
- ✓ Each separated channels are played back at CD quality sound. (Frequency band: 20Hz ~ 20KHz)

◆ Linear PCM (Pulse Code Modulation)
- ✓ Provides the high quality Digital sound without the audio data compression.
- ✓ Various Digital Recordings are possible as shown in the table to the right.

Sampling Frequency	Bit Rate
48KHz	16bit
	20bit
	24bit
96KHz	16bit
	20bit
	24bit

◆ Dolby Digital compatible Audio Mode

Audio Coding Mode	Channel Format					Remark
	Front			Surround (Rear)		
	L	C	R	L	R	
1/0		O				Mono
2/0	O		O			Stereo
3/0	O	O	O			Surround
2/1	O		O	Mono		
3/1	O	O	O	Mono		
2/2	O		O	O	O	
3/2	O	O	O	O	O	

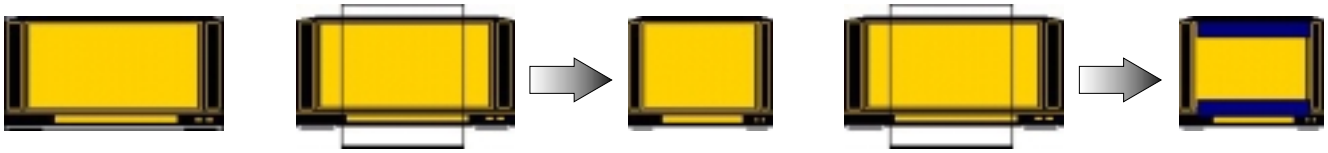
DVD-Video Feature 4 — Multi-Language

- Audio Dubbing - Max. 8 Languages
- Subtitle - Max. 32 Languages. Capable of storing, and selectiong.
- Linear PCM (Pulse Code Modulation)

DVD-Video Feature 5 — Multi-Aspect

- Unlike the conventional VCD or LD, DVD-Video has the default of 16:9 Wide, and can be viewed using the conventional 4:3 TV, enabling the expansion of viewer selection capabilities.

  ✓ 16 : 9 TV : Wide Mode (16:9 Wide Full Screen)
  ✓ 4 : 3 TV : Letter Box Mode, Pan & Scan Mode

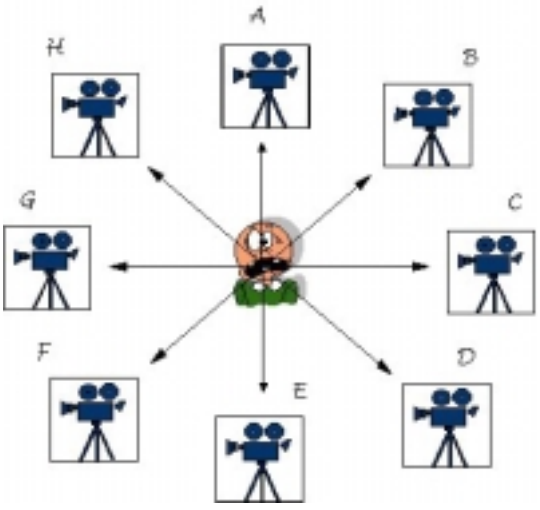


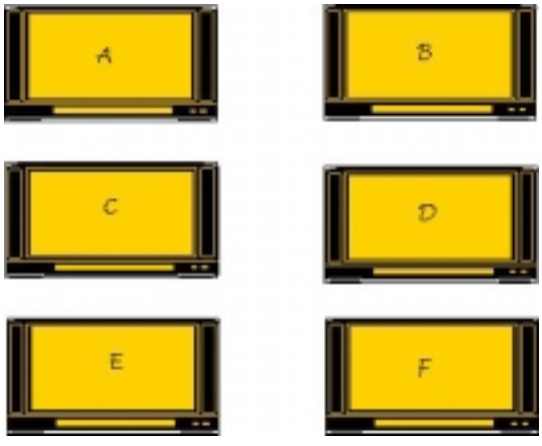
16:9 Wide 4:3 Pan & Scan 4:3 Letter Box

Note ; Only enable to be worked correctly by an appropriate data supported this function in Disc.

DVD-Video Feature 6 — Multi-Angle

- Up to 9 angles of view may be stored, enabling the viewer to select a specific viewpoint at a given time.
  --> Especially, for the Music Video and Sports Title, this provides a more lively image of the scene.





Note ; Only enable to be worked correctly by an appropriate data supported this function in Disc.

DVD-Video Feature 7 | **Multi-Story**

◆ DVD-Video provides the enviroment suitable for the bi-directional Software develoment, providing multiple scenarios. This feature enables the Multi-Story function.

OPTION | **Parental Lock**

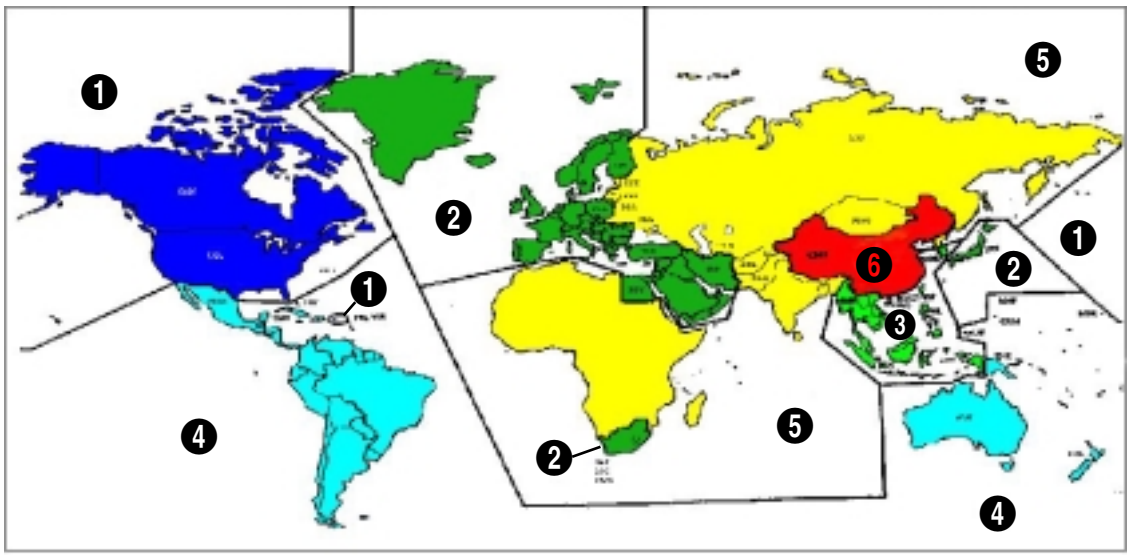
◆ For the titles that are not suitable for children viewing, Parental Locks are set, requesting user defined passwords for viewing
◆ Parential Locks may be set on specific frames of the Title, enabling the player to skip those frames during playback.

COPYRIGHT | **Regional Code & Macrovision**

◆ Classify the world into 6 regions, and if the DVD Title and the Player's "Reginal Code" do not agree, playback is prohibited.

⌘ **Regionnal Coding is optional for the Soft developers (Region 0 All Code), but the Hardware developers must adopt the appropriate regionnal code for sale.**

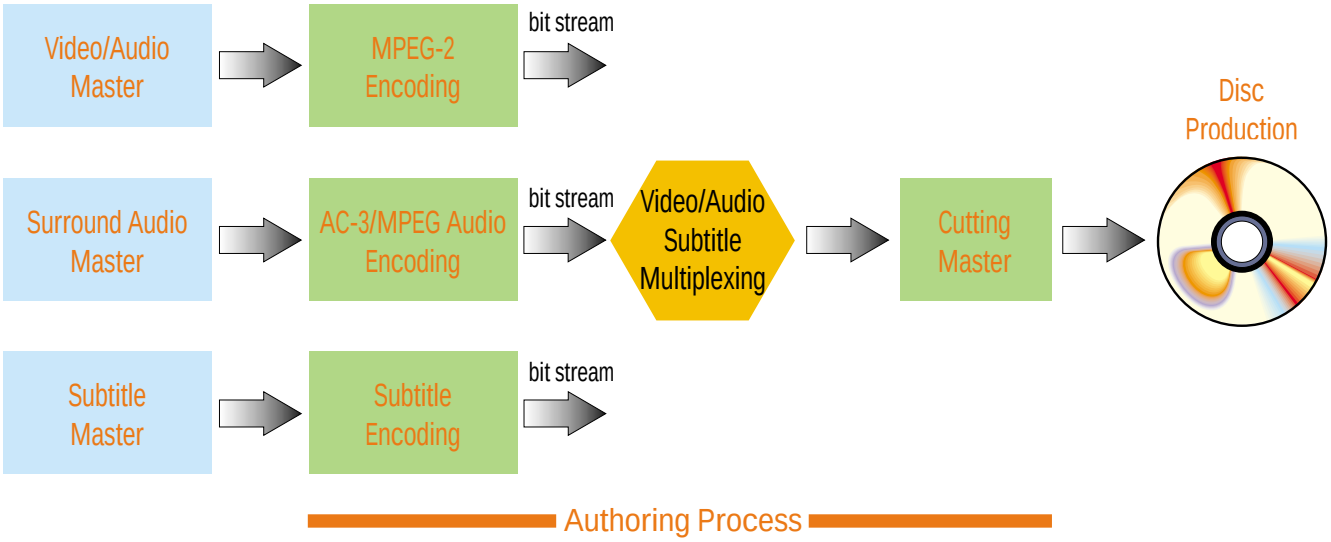
✓ Region 1 : The United States and its territories, Canada.
✓ Region 2 : Europe, Japan, Greenland, Egypt, South Africa, the Middle East.
✓ Region 3 : Taiwan, Hongkong, Korea, South East Asia.
✓ Region 4 : Mexico, South America, Australia, New Zealand.
✓ Region 5 : Russia, Eastern Europe, India, Africa.
✓ Region 6 : China.
✓ Region 0 : Worldwide (All Code)



◆ Adoptation of the Macrovision System disables the copying on to other media.

Remark | **DVD-Video Authoring Process**

◆ The image quality of the DVD-Video may vary accoring to the quality of the Master and the Authoring Process

✓ The image quality of the DVD-Video varies according to the Digital Mastering Source such as the conventional LD, VCD, or Original Film.
✓ Different Authoring Process are used accoring to the Software developers, and this may affect the DVD image quality.

⌘ Authoring Process